Final report
Study Visits (2021-2022) – Bilateral State Scholarships

Dear TPF team,

I would like to present a brief report about my study visit for 6.5 months (from 15.06.2022-31.12.2022), at Plant Biotechnological Laboratory of **Prof. Dr. Judit Dobránszki**, Faculty of the Agricultural and Food Science and Environmental Management, Centre for Agricultural Genomics and Biotechnology, Debrecen University, Nyíregyháza 4400, Hungary.

The topic was: **Towards Improving the Quality of Micropropagated Apple by Modifying of Medium Composition and Its Effect on Shooting and Rooting *In Vitro***

The aim of the study was to examine the effect of different cytokinins on shoot multiplication, and transcriptional activity of *in vitro* micropropagated Apple 'Húsvéti rozmaring'

The tasks achieved during the study visit scholarship:

1. **Propagation of plant materials**: the shoots of Húsvéti rozmaring apple were separated from its *in vitro* cultures then, the lateral leaves have been removed where the separated shoots contained the shoot tip. These shoots have been transferred on the optimal medium for shoot multiplication in order to get enough plant materials to start the experiment and to keep them as well.
2. **Transfer the shoots to free cytokinin medium:** The multiplicated shoots of Húsvéti rozmaring cultivar have been separated, then they were cultured on MS medium free cytokinin after removal of the lateral leaves and keeping the shoot tip to be ready after 4 week to transfer on the treatment (MS medium supplemented with cytokinin; where different cytokinins will be used (i.e., TDZ, BA, BAR, TOP, KIN and 2iP) at different concentrations (i.e., 0, 2, 4, 6 and 8 µM). Where, these cytokinins will be added separately to the medium. The treatment contains 25 jars (replicates) where each jar contains 5 shoots ≈2 cm; (6 cytokinins × 5 concentrations = 30 treatments)
3. The previous two points have been repeated until finish from all treatments
4. **Collecting samples:** samples were collected from three jars (replicates) at zero hour, 24h, 48h, one week and 4 weeks in 2 mL tubes using liquid nitrogen, then they were kept immediately in the freezer at– 80 °C for isolation of mRNA to study the transcriptional activity in micropropagated apple shoots as a response to different types and concentrations of cytokinins added to the medium.

5. **Multiplication measurements:** (1) fresh weight of microshoots, (2) multiplication rate (number of microshoots/explant or shoot), and (3) the length of microshoots have been estimated from five jars or replicates after four weeks.
6. **Recording data** for each treatment and start to write the original article

The published articles:

1. **Abdalla N**., El-Ramady H., Seliem M. K., El-Mahrouk M. E., Taha N., Bayoumi Y., Shalaby T. A. and **Dobránszki J.** (**2022**). An Academic and Technical Overview on Plant Micropropagation Challenges. Horticulturae 8, 677 https://doi.org/10.3390/horticulturae8080677 (**IF: 2.923**)

2. Mohamed S. M., El-Mahrouk M. E., El-Banna A. N., Hafez Y. M., El-Ramady H., **Abdalla N.** and **Dobránszki J.** (2023). Optimizing Medium Composition and Environmental Culture Condition Enhances Antioxidant Enzymes, Recovers *Gypsophila paniculata* L. Hyperhydric Shoots and Improves Rooting *In Vitro*. Plants, 12, 306. https://doi.org/10.3390/ plants12020306 (**IF: 4.658**)

I would like to thank **Prof. Dr. Judit Dobránszki** and her staff team for the hostility and a great collaboration hoping for more in the future. I have to thanks TPF and the Hungarian Government for giving me this chance to work, to learn and publish, hoping to get more scholarship funded by TPF.

Dr. Neama Abdalla